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Big Dragon, Little Dragons:

China's Challenge to the Machinery Exports of Southeast Asia

Sjamsu Rahardja

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Abstract

This paper investigates the extent of China's export boom in machinery and analyzes trade in components and finished machinery between China and Southeast Asia. China has increased its world market share in machinery exports. The median relative unit value of its finished machinery exports has also risen. Yet the author finds no evidence that China's expansion in the world machinery market has squeezed the market shares of Southeast Asian machinery exports. Instead, components made by Southeast Asian countries are increasing in unit value and gaining market share in China.

This paper—a product of the East Asia Poverty Reduction and Economic Management, Financial and Private Sector Unit—is part of a larger effort in the department to study changes in trade pattern among countries in East Asia. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Katie S. Shaw, room MC 8-188, telephone 202-458-1307, fax 202-522-3094, email address kshaw@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at srahardja@worldbank.org. August 2007. (36 pages)

Big Dragon, Little Dragons:
China's Challenge to the Machinery Exports of Southeast Asia

Sjamsu Rahardja *

JEL Code: F1, F2

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* The World Bank Office in Jakarta

I. Introduction

Machinery products are important for the trade and economic development of East Asia. Studies and informal observations show that export promotion in machinery was part of the success story of Japan and the newly industrialized economies, South Korea and Taiwan, China.[1] In recent years, machinery has also become a key driver of trade in developing East Asia i.e., China, Indonesia, Malaysia, Philippines, and Thailand. In 2000-2004, machinery products accounted for half of the total imports of these countries. Excluding China, the share of machinery in total exports of those countries has increased to 51 percent in 2000-2004 from 38 percent in 1990-1994, superseding shares of other product groups.

The story for the "big dragon" China is even more fascinating. China transformed its export structure with full thrust into a machinery exporting giant with interesting dynamics. The share of machinery in China's total exports leaped to 41 percent in 2000-2004 from 18 percent in 1990-1994. China's share in world machinery exports has increased almost 5 times in a decade, from 2.3 percent in 1994 to 11 percent in 2004. Thanks to FDI influx, Chinese machinery products are also showing signs of moving up the technology ladder. Having started out as a mass producer of labor-intensive and low technology goods, casual observations suggest that current Chinese exports of machinery have incorporated the latest innovations and more advanced technology. The share of personal computers with the latest processor and related accessories have overtaken the share of metalworking tools in China's total exports. China is also exporting more cellular phones, personal digital assistants and flat screen TVs rather than transistor radios as previously.

Given these developments, manufacturers in Southeast Asia i.e., "little dragons" (Indonesia, Malaysia, Philippines, and Thailand) have become anxious about China's rising capability in producing machinery.[2] They now feel competitive pressure from machinery "made in

[1] Kokko (2002) provided a survey on how Japan used government intervention to promote 44 strategic industries including steel and shipbuilding.

[2] I exclude Singapore from the list because in my opinion it has successfully transformed its economy into a services hub for the region.

China" in third markets as well as in their own backyards. In 1993 China's exports of machinery to the world were almost the same as Malaysia's, however, in 2004 China's machinery exports were already 4 times more than Malaysia's. As for home markets, manufacturers of motorcycles in Indonesia have complained about the flood of cheaper Chinese versions. Another concern is the loss of FDI resulting from positive externalities from manufacturing machinery products in China rather than in the other Southeast Asian countries. Firms in Japan, South Korea, and Taiwan, China might be leaning towards relocating to China instead of producing in Indonesia, Malaysia, Philippines, or Thailand, which could mean loss of jobs and investment in these countries.

Despite China's bold maneuver, the big dragon shaking its tail could also benefit the little ones. China's increasing role as an assembly hub could provide opportunities for suppliers of components from Southeast Asia. The current pattern of trade and investment suggests that machinery is put together with the help of a network of suppliers known as a production network. As a result of the fragmentation of the production process, a Chinese assembler needs only to focus on its competitiveness in assembling parts and components while relying on highly skilled suppliers in Southeast Asia or elsewhere with lower cost.[3] Chinese assemblers can also delegate the manufacturing process of components that mainly use resource-based inputs - such as rubber and metallic ores - to resource rich countries such as Indonesia and Malaysia.

Thus what might be interesting for many, including policy makers in Southeast Asia, is the extent of externalities resulting from China's increasing machinery exports. Against this background, we explore how trade in components and finished products of machinery is behind the trade between Southeast Asia and China. Second, we look at the competitiveness and relative sophistication of China's machinery products versus those made by Southeast Asian countries. Third, we use regression analysis to look at whether expansion in Chinese machinery exports has any impact on unit value and export composition in machinery from

[3] Jones and Kierzkowski (2001) provide a general framework on the fragmentation of production activities. Ando and Kimura (2007) argue that falling costs of servicing different production blocks have driven the fragmentation process of trade in machinery towards economies in Developing East Asia.

Southeast Asia. Finally, we explore the extent to which Southeast Asian countries have been involved in the production sharing network to support China's role as the hub for final assembly.

This study adds new findings to the already rich literature on trade in East Asia. We document both competing and complementary forces as economies in East Asia integrate. We also explore the extent to which changes in structure and value of exports in machinery from Southeast Asian countries can be credited to China. In many aspects our paper complements other studies on intraregional trade (such as Kawai, 2005), production fragmentation and trade (Ando and Kimura, 2003, 2007, and Kimura et al, 2005), and technology upgrading in exports from East Asia (Gaulier et al, 2005). In addition, this paper sheds light on China's and Southeast Asia's progress on the quality ladder of machinery products.

II. The Pattern of Trade in Machinery in China and Southeast Asia

The data show clearly that China has taken off to become one of the world's most important machinery exporters. Figure 1 indicates that in 1975 China was an underdog in the world market of machinery products, even compared to Malaysia and Singapore. In 1989, Chinese exports of machinery overtook Malaysia and less than 7 years later superseded Singapore. In 2003, total machinery exports from China were already higher than machinery exports from Indonesia, Malaysia, Philippines, Singapore, and Thailand combined.

Office data and telecommunications products have played a crucial role in China's success in terms of machinery exports. China alone has market shares of almost 16 and 8 percent respectively in the global export of those commodities. However, other countries in Southeast Asia are also becoming important players in global trade in machinery. For example, exports of office/data processing machines, telecoms equipment and electrical machinery from Malaysia and Philippines are increasingly gaining importance.

Table 1 documents the changes in market share of export in machinery of countries in Developing East Asia (China and Southeast Asia excluding Singapore). Lightly shaded cells show products with decreasing market shares while dark shaded ones show those with increasing shares. When it comes to office/data processing and telecoms products, China alone holds almost 16 percent of market share in global exports. China's export market share in those two product categories increased more than 5-fold in 10 years, from 3 percent in 1993-94. China's second largest export mover is electrical machinery, the market share of which increased almost 3.5 times, from 2.4 percent in 1993-94 to 8 percent in 2003-04. Overall, Developing East Asia has clearly increased its presence in global trade in machinery. As a whole, in 2003-2004 the group had more than doubled their world market shares in office/data processing machines and telecoms equipment as compared to a decade earlier, jumping to almost 23 percent from 10 percent in 1993-1994. Countries in the group are also increasingly present as exporters of electrical machinery, their share in world exports having increased to 16 percent in 2003-2004 from 10 percent in 1993-2004.

Most countries in developing East Asia are importers of components and exporters of finished machinery. Table 2 shows that shares of components and finished products, respectively, in total imports and exports of machinery have increased. With the exception of Indonesia, the share of components in total machinery imports has increased significantly in developing East Asia. From 1993-1994 to 2003-2004, the share of components in total imports has increased by 36, 26, 15, and 9 percent in the Philippines, China, Malaysia, and Thailand, respectively. On the export side, Indonesia and the Philippines are lagging behind other developing East Asian countries when it comes to increasing the share of finished products in machinery exports.

The East Asia region has become an important source of machinery imports for developing East Asia. First, Table 3 shows that more than half of East Asia's imports in finished machinery came from the region (summing up first seven columns in Table 3). Developing East Asia is increasingly sourcing machinery from the newly industrialized economies instead of Japan and the United States. Countries such as Indonesia, Malaysia, the Philippines, and Thailand increased their shares of imports of machinery from China and the

newly industrialized economies at the expense of Japan and the United States. The same pattern also appears on the export side. As shown in Table 4, more and more machinery exports from developing East Asia are heading to East Asia (excluding China). The rows of Table 4 indicate the increase in share of exports in components and finished machinery from developing East Asia to the East Asia region.

We also confirm the results of other studies by showing that components are largely behind the trade in machinery in developing East Asia. As shown in Figure 2, exports of components contribute 76 percent to export growth in machinery from the Philippines. Exports in finished products contribute 59 percent in changes of export in machinery from China. The import side presents an even more dramatic picture. Figure 3 shows that components are a key driver of Philippines imports of machinery. Similarly the figure also shows that parts and components are driving China's imports of machinery, highlighting the importance of final goods assembly in China.

For Southeast Asia, China is playing an important role as source of and market for machinery components. The proportion of machinery components coming from China to Southeast Asia has increased significantly. For example, the share of Malaysian and Thai imports of components from China increased almost 18 and 7 times, respectively, in 10 years. In the next section we will see evidence that China is an important supplier of components with relatively low value for manufacturers of machinery in Southeast Asia. This increase in shipping of components to Southeast Asia has been happening in parallel with the increase in China's exports of finished machinery. An interpretation could be that Chinese firms are taking advantage of Southeast Asian capacities for further refinement of components before they are shipped back to China and assembled to the final product. This hypothesis is supported by the fact, that China is becoming an important export destination for components made in Southeast Asia. Over the last 10 years, the proportion of exports in components which have been shifted to China has increased by almost 5 times for Indonesia, 15 times for Thailand, 19 times for Malaysia, and exponentially 60 times for Philippines. These findings suggest that there might be a certain degree of complementary between China and Southeast Asia regarding trade in components.

III. Comparing Performance of Exports of Machinery: China versus Southeast Asia

Having described the broad pattern of trade in machinery in developing East Asia, we next look at performances in machinery exports within developing East Asia, comparing Southeast Asia with China. We will examine the similarity, competitiveness, and value of exports in machinery from Developing East Asia and how they have changed in the last ten years.

The main conclusion from this analysis is that machinery exports between China and Southeast Asia are increasingly similar. To measure export similarity, we use the Finger and Kreinin index as it provides information on the extent of potential market displacement caused by competition (Finger and Kreinin, 1979).[4] Calculating the index for various machinery products indicates that exports from China and countries in Southeast Asia are becoming increasingly comparable (Table 5). With the exception of road transportation, the index of export similarity has increased over the last ten years, both in components and finished machinery. Products that seem to have a high degree of export similarity are components of electronics products office machinery and telecommunications equipments. In fact, the index of export similarity between China and Southeast Asian countries on the latter product has increased significantly. We also consider a bilateral index of export similarity among countries in developing East Asia (Table 6). There we find that exports in components from China is becoming more similar to that from Indonesia and Thailand while Chinese exports in finished machinery is becoming highly similar to those produced by Malaysia.[5]

A Revealed Comparative Advantage (RCA) approach shows that all countries in developing East Asia have increased their comparative advantage in exporting machinery products vis-

[4] The formula for similarity index is given by: $\S_k$ min(Sijk, Sjik), where S is share of export in product j in total export, i and j are countries, and k: 1,…,K indicates product category.

[5] However I do not rule out the possibility that China's similarity to other Southeast Asian countries in exporting components is due to data aggregation. Southeast Asian countries might imported Chinese components, upgraded them, and exported them back to China without changing their product classifications.

à-vis the rest of the world (shown by Table 7 and scatter-plots [6] Figure 4 and Figure 5). [7] The RCA index and the percentage of RCA index greater than one show that most of these indicators have gone up. More particularly, the data shows that China is the only country in developing East Asia that has RCA greater than one in both component and finished machinery. In Figure 4, China has both components and finished machinery products in the northwest quadrant of the scatter plot, suggesting significant increase in comparative advantage. The data also reveals that overall the Philippines and Thailand have increasing comparative advantage in producing components of machinery. We also find that the proportion of Chinese export in components and finished machinery with an RCA index greater than one has jumped. In 2003-2004, 27 and 32 percent of export in component and machinery from China had an RCA index greater than one, a significant increase from 9 and 17 percent in 1993-94.

Based on technological classifications introduced by Lall (2000), most countries in developing East Asia have enhanced their technological capacity and become manufacturers of high technology products. The RCA indices for high technology products have increased significantly for countries in the group, with exception of Indonesia (Table 8). Countries such as Malaysia and the Philippines stand out as the most competitive manufacturers of high technology products among countries in developing East Asia. Nevertheless, we also find that China has more products with an RCA index greater than one than any other country in developing East Asia. The latter suggests that China is not only acquiring competence in technology to manufacture but also is becoming more competent in broader range of machinery products.

Next we look at the relative unit value of export in machinery across countries in Developing East Asia. Relative unit value is often used as a proxy to measure higher capital intensity and skill deepening in production processes relative to countries that are falling behind (see, for

[6] Numbers used in scatter plots are from Table 4.

[7] Formula for RCA index for country j in product k is given by $RCA_{jk} = (X_{j,k}/X_j) / (WX_k/WX)$. X_{jk} is export of product k from country j and X is total export of country j. Similarly, WX_k and WX is world export of product k and total export, respectively.

example, Schott, 2004). For each product relative unit value equals the value of exports divided by volume which in turn is divided by world import value relative to volume.[8] Medians of unit value across countries are then plotted in Figure 6. Points along the diagonal 45^0 line are positions in which unit values remain constant. Thus the left-side of the diagonal line indicates positions in which values unit in 2003-2004 have increased compared to 1993-1994 and vice versa.

The changes in relative unit values in machinery components suggest that the Philippines is exporting more expensive machinery components, but not China.[9] Medians of relative unit value of export in components from developing East Asia have increased significantly over the last ten years as shown in Figure 6. The scatter plot suggests that relative unit value for components in 2003-2004 has increased compared to 1993-1994. Within this category, the Philippines have seen the highest increase in median relative unit value of export in components compared to other developing East Asian countries. On the other hand, the relative unit value of exports in components from China has not increased and has remained lower than that of other countries in the region.

As for products of finished machinery, the landscape of relative unit value of export across countries in the region tells a different story. Instead of increasing, relative unit value of export in finished machinery has declined for most of countries in developing East Asia. As shown in Figure 6, exports of finished machinery from Malaysia and Thailand had a relatively higher unit value in machinery exports in 1993/94. However, their relative unit values have decreased in the last ten years - they are located below the diagonal line. Further, relative unit value of some countries, such as Indonesia and Philippines, has not increased in the last ten years. The only country in developing East Asia that managed to increase its exports unit value of finished machinery is China. This finding suggests that

[8] Unit value of export from country i in product k = $(X_{ij} /QX_{ik}) / (WM_k /WQM_k)$. X, QX, WM, and WQM are export value, export quantity, world import value, and world import quantity, respectively.

[9] Malaysia has been one of main suppliers of PC components for Dell, a US PC maker. At the time this draft was written, Texas Instruments was close to deciding on an expansion of its investment in high-tech electronic chip making in the Philippines.

Chinese machinery products have been increasingly sophisticated, incorporating new inventions.

The findings presented here are pieces of evidence suggesting that China is putting competitive pressure on machinery exports from developing East Asian countries. The structure of export in machinery between China and other developing East Asian countries are increasingly similar. We also find China has increased its comparative advantage in finished machinery relative to other developing East Asian countries. While unit value of export in finished machinery has declined for countries in developing East Asia, median unit value of Chinese finished machinery has increased.

The previous tables and figures in this section convey important messages about the dynamics of trade in machinery in Developing Asian countries. Overall, they show an increase in competence in producing machinery among countries in developing East Asia, especially products that are considered as high technology. They also show a shift toward specialization that has been taking place in some countries, such as the Philippines in producing components and China in producing finished machinery. The increase in relative unit value of China's exports of finished machinery might be caused by more expensive components it imported from Southeast Asian countries. But it could also suggest that China has been making progress in the quality ladder. However this evidence is inadequate to shed light on the possible effect of China's expansion on exports of machinery from other Southeast Asia. Therefore we turn to regression analysis in the next section.

IV. Regression Analysis

We start this section by laying out our objectives for empirical analysis. Our first objective is to look at the extent to which the emergence of China as an important player in global trade in machinery is putting competitive pressure on price. Excellent road and power infrastructure in industrial areas have enabled China to lower costs of production. Further, in addition to the export market, the vast potential in China's home market allows for

significant scale economies and produces a comfortable margin for competition. Therefore, we expect that an increase in China's export volume in machinery would drive down the price of machinery exports from other countries, including Southeast Asia. We also expect that the effect is significant for finished machinery where China is increasingly gaining comparative advantage. However, we let the data tell us what is happening in machinery components.

To test our first hypothesis, we estimate a linear regression model where we test whether the unit value of exports in machinery from Southeast Asian countries is affected by the quantity of China's exports. The model is given as:

$$\ln V_{ijkt} = \alpha_0 + \alpha_1 * F_{jk} + \alpha_2 \ln Q_{jkt-1} + \alpha_3 (F_{jk} * Q_{jkt-1}) + \alpha_4 \ln V_{ijt-1} + Z_{ijt}\beta + \varepsilon_{ijt} \quad (1)$$

where V is unit value of export, F is a dummy variable for finished good, Q is the volume of export from China, Z is a matrix of covariates, and ε is the error term. The subscript i, j, k, and t represent country (Indonesia, Malaysia, Philippines, and Thailand), product classification at 6 digit HS, category (components or finished product), and time spanning from 1992-2004.

To control for observables characteristics, we include a set of covariates Z such as: time, product, country dummies and their interactions, import of capital goods, world GDP per-capita (excluding the reporter country i), difference between country i GDP per capita and world GDP per capita, and world tariff rates. Note that we also include lagged dependent variable on the right-hand side of equation (1) to allow the possibility of previous period determining the current period of unit value; a control for possible rigidity. Had we not included the latter variable as a regressor, lagged volume of Chinese export, Q, could have correlated with the error term. This problem arises because China's export volume at time t-1 might correlate with world import price in t-1. We also include the share of import of capital goods from China as a control for possible cheaper imports of capital goods from China. Assuming the lagged volume of exports from China and unit value, Q_{jt-1} and V_{ijt-1}, are predetermined, we estimate equation (1) using OLS.

The second objective is to explore whether the increased presence of China in the global trade in machinery has caused changes in the market share of export in machinery from Southeast Asian countries. As shown in the previous section, export of machinery from China is rapidly gaining market share. However, we also see that exports of machinery from countries in Southeast Asian are increasing their presence in the global market. The empirical model for our analysis on this question is given as:

$$\Delta MS_{ijkt} = \delta_0 + \delta_1 * F_{jk} + \delta_2 \Delta CMS_{jt-1} + \delta_3 (F_{jk} * \Delta CMS_{jt-1}) + \delta_4 \Delta RCA_{ijk\,t-1} + W_{ijt}\Gamma + \xi_{ijk\,t} \quad (2)$$

On the left-hand side of equation (2), ΔMS is change in global market share of product category k: component, finished, in the export of commodity j from country i at time t. On the right hand side, F is a dummy variable for finished goods ΔCMS is China's change in global market share for product j at time t, ΔRCA is the change in the revealed comparative advantage index (scale to 0 to 100) product j category k, and Γ contains other covariates similar to Z in equation (1). To control for degree of comparative advantage in a particular product in a particular country, we include the lagged change in the RCA index on the right-hand side of equation (2).

The third objective is to examine the direction of specialization in the context of product fragmentation. The data suggests that several countries are becoming more competitive in producing components. Recall from presentations of Table 7 and Figure 4, with exception of China, countries in Southeast Asia performed better on exports in components than in finished machinery. Therefore, we examine the extent to which China's shift in specializing in finished machinery is causing Southeast Asia to shift their exports of components to China. The empirical model for this objective is given as:

$$SCC_{ijt} = \gamma_0 + \gamma_1 CMF_{jt-1} + \gamma_3 RCAC_{ij\,t-1} + W_{ijt}\Pi + \eta_{ij\,t} \quad (3)$$

On the left-hand side of equation (3), SCC is the share of export in components of product j from country i to China at time t (share of export going to the world is 100 percent). On the

right hand side, CMF is China's global market share for finished machinery of product j at time t-1, RCAC is the revealed comparative advantage index in components for country j (scale to 0 to 100) at time t-1. Finally, matrix W contains covariates such as dummy variables for industry, location, time, and China's import tariff.

For equation (3) we reclassify our product into 3-digit SITC, broader than the classification used in equation (2). This relatively more aggregate category reduces the extreme variation in market share that one would obtain with a more detailed product category, which allows us to better examine the effect of spillover. In our sample, we also keep products that have components in their classification. Finally, because some countries do not engage in export of particular products, SCC is censored from below. Thus we estimate equation (3) using Tobit with zero as the lower censoring point.

We estimate equation (1) to (3) using pooled time series and cross product data. The time series spans 1992 to 2004, while the cross product varies depending on the estimated equation. Most of our trade data are from UN-Comtrade and the rest are obtained from the World Bank WDI database.

We summarize our results from estimating equation (1) to (3) in Table 9 and present the detailed results in Appendix A. Numbers in the 1st subcolumn of the 1st column in Table 9 represent estimates of coefficient α_2 of equation (1), which is components, while numbers in the 2nd subcolumn represent estimates of $\alpha_2 + \alpha_3$, i.e., the net effect of quantity on unit value of the finished product. Other columns present results from estimating equation (2) and (3). Rows in Table 9 represent the scope of sample in which equations (1) through (3) are estimated. Results that are statistically significant are given "(+)" or "(-)" sign, while "n.s" indicates those that are not.

The results of estimating equation (1) suggest two important findings. First, we find α_2 to be positive and statistically significant. This implies that China's increase in the volume of exports in components is associated with increasing unit value of export of components from Southeast Asian countries. We find net coefficient for $\alpha_2 + \alpha_3$ is negative and statistically

significant. This suggests the emergence of China's finished machinery is associated with decreasing unit value of export of similar products from Southeast Asian countries. This result is also robust after controlling for possible rigidity in unit value and import of capital products from China as shown in Table A.1. Looking across major product categories, the previously described results occur simultaneously in electrical equipment and road transportation. Further, decreasing unit value in finished machinery from Malaysia and Thailand is associated with the emergence of China. What is also interesting is that exports of finished machinery of these products from developing Southeast Asia is very similar to that exported by China (as shown by the similarity index in Table 6).

From estimating equation (2), estimates of both δ_2 and $\delta_2 + \delta_3$ are not statistically significant in all cases. Therefore overall we find no evidence that change in market share of exports from Southeast Asian countries is associated with China's expansion. As shown in the 2nd column of Table 9, we neither find evidence across major product categories, nor across countries, that would suggest that China's surging market share in machinery is squeezing market shares of machinery manufacturers of Southeast Asia. As shown in Table A 6, instead, the change market shares in global machinery exports are significantly associated with the level of comparative advantage. The negative and significant coefficient suggests that a previously lower RCA index tends to be reflected in declining market shares. The result is robust after controlling for product and other characteristics, even if we take out the RCA index from the equation. This finding implies that, if any, a decrease in market share of exports of finished machinery is not associated with China.

From equation (3), we show how China's increasing share in global export of finished machinery is driving exports in components from Southeast Asian countries. The 1st row of the 3rd column in Table 9 presents a result that shows a positive and statistically significant γ_2. This implies that China's expansion in finished machinery has caused manufacturers of components in Southeast Asia to ship to China rather than to other regions. Across product categories, China's expansion significantly affects export of components of office/data processing machinery, telecoms equipment and electrical machinery from Southeast Asia. This is an interesting finding because Chinese office/data processing machinery & telecoms

equipment have the highest increase in the global market share. Across countries we find that China's expansion attracts exports in components from Indonesia and the Philippines. These findings illuminate the important role of China as an assembly hub in the regional production network.

Results from the regression analysis indicate that China's expansion of exports in finished machinery is associated with lower unit value of export in finished machinery from Southeast Asian countries. Meanwhile, we find that this is not generally the case for export in components of machinery. Regression results also show no evidence that change in market shares of export in machinery from developing Southeast Asian countries is associated with China's expansion. Finally, we also find that a reorientation of exports in components from developing Southeast Asian countries is associated with China's surging exports of finished machinery products. This evidence shows how manufacturers in Southeast Asia are becoming suppliers of components to support China in assembling finished products.

V. Conclusion

This study adds to the literature on China's export boom. We illuminate changes in China's composition and value of machinery exports as the country transforms into an important global player in machinery. During that process, machinery "made in China" is putting competitive pressure on similar finished machinery products made by Southeast Asian countries. At the same time, China is also becoming an important market for exports of machinery components from Southeast Asian countries.

But there is an interesting twist. We find that Southeast Asian countries are becoming China's suppliers for machinery components with higher value than what China was exporting to them. This evidence might reflect Southeast Asian countries enhancing Chinese made components, before these are subsequently being assembled by Chinese manufacturers. This finding might also suggest tendencies among Southeast Asian countries

to specialize in producing components with higher value. Either of these possible scenarios points to China as a huge market for high value machinery components from Indonesia, Malaysia, the Philippines, and Thailand.

Our work falls short of explaining the cause of these dynamic changes. We have documented changes in exports of machinery from Southeast Asian countries that are associated with China's increasing role in global trade. So far we have not shown the fundamental driving forces for such transformation in trade of machinery in the region, such as the role of FDI, real wage differentials, or labor productivity. We also have not looked in detail at the reshuffling of shares of exports in different markets as China increasingly enters the global trade arena. We also have not yet discussed the consequences competition from China in the relocation of production activities. Perhaps our findings can encourage further research investigation on this topic.

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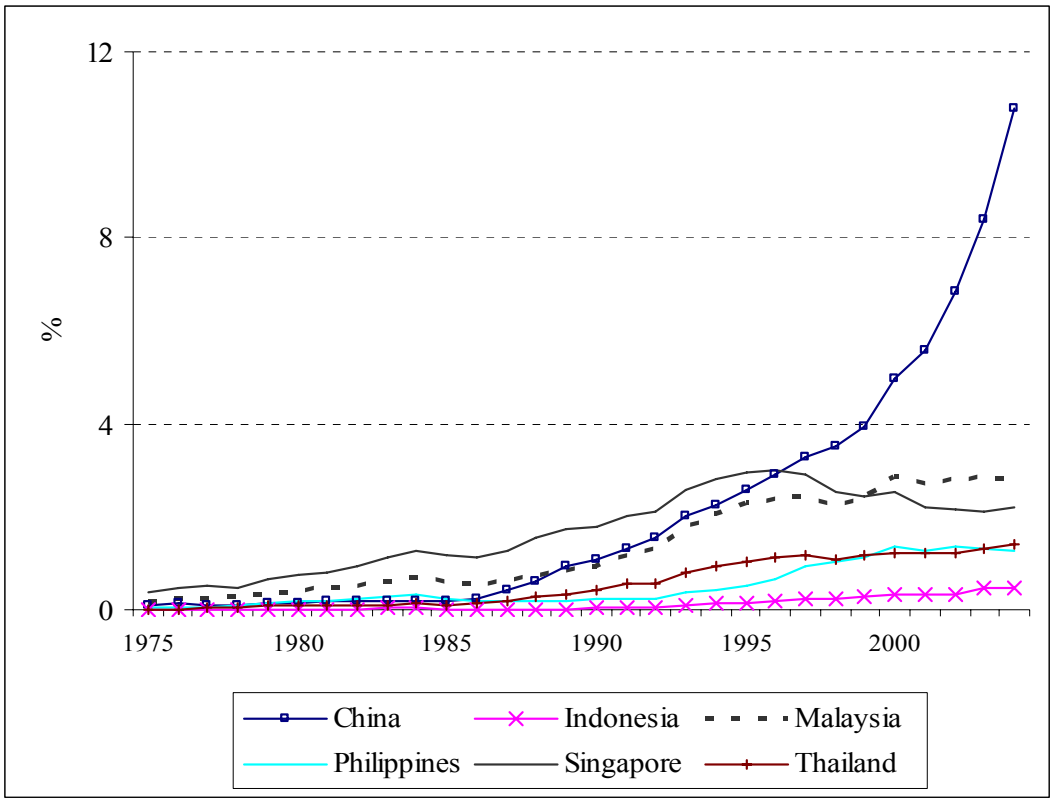
Figure 1. Share in World Exports of Machinery



Source: UN-COMTRADE

Table 1. Share of Exports and Imports in the World Market

	Power generating eqp.		Industrial machinery		Office, data & telecom		Electrical machinery		Road transportations		Other transport	
	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04
Exports												
Indonesia	0.1	0.4	0.1	0.1	0.6	0.7	0.4	0.6	0.2	0.1	0.4	0.1
Malaysia	0.8	0.3	0.6	0.5	4.3	3.6	4.8	3.0	0.1	0.1	1.2	0.4
Philippines	0.0	0.1	0.0	0.1	0.4	1.1	1.5	2.7	0.1	0.2	0.0	0.3
Thailand	0.6	0.8	0.6	0.6	2.0	1.7	1.4	1.6	0.3	0.5	1.0	1.6
China	*1.3*	*2.4*	*1.0*	*3.3*	*2.8*	*15.7*	*2.4*	*8.2*	*0.5*	*1.6*	*1.2*	*2.8*
Developing EA	2.8	3.8	2.3	4.7	10.1	22.8	10.5	16.0	1.1	2.6	3.8	5.1
Imports												
Indonesia	1.8	0.6	2.0	0.7	0.3	0.2	0.8	0.2	0.7	0.3	1.2	0.6
Malaysia	1.7	0.8	2.4	1.0	1.6	1.2	6.3	4.9	0.4	0.3	2.4	0.9
Philippines	1.2	0.2	0.6	0.3	0.4	0.6	0.8	2.8	0.3	0.2	0.9	0.4
Thailand	1.9	1.0	2.4	1.3	1.3	0.9	2.5	2.0	1.1	0.4	2.6	0.6
China	*3.8*	*4.5*	*7.9*	*8.6*	*2.6*	*5.5*	*2.8*	*9.4*	*1.5*	*1.9*	*3.8*	*2.6*
Developing EA	10.4	7.0	15.3	12.0	6.1	8.3	13.1	19.4	4.0	3.0	10.9	5.0

Note: Lightly (dark) shaded figures are products with increasing (decreasing) market shares.

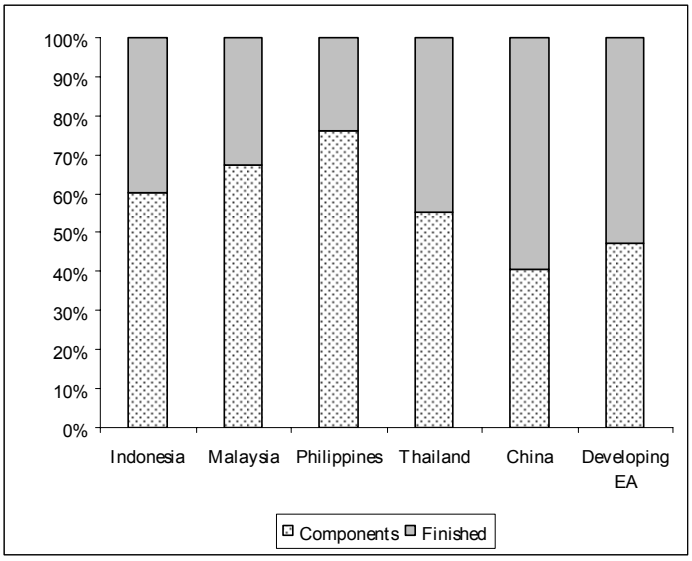
Source: UN-COMTRADE

Table 2. Share of Imports and Exports in Machinery

	Indonesia		Malaysia		Philippines		Thailand		China		Developing EA	
Imports	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04
Power generating eqp	13.1	10.3	4.9	3.4	12.2	1.3	5.7	5.3	5.3	4.8	6.5	2.1
Component	2.8	5.6	1.0	1.1	6.3	0.5	2.1	2.7	1.5	1.6	1.9	0.4
Finished	10.3	4.7	3.9	2.3	5.9	0.8	3.6	2.6	3.8	3.2	4.6	1.7
Industrial machinery	44.3	39.2	22.5	12.0	22.9	7.0	31.4	23.5	45.3	28.3	35.6	9.0
Component	12.2	16.3	6.5	4.7	9.7	3.0	8.2	7.7	7.5	7.5	8.0	3.7
Finished	32.1	22.9	16.0	7.3	13.2	4.0	23.2	15.8	37.8	20.8	27.6	5.3
Office data & telecom	8.4	12.9	15.3	23.1	15.7	22.6	17.8	24.2	17.3	27.9	15.8	57.8
Component	3.4	1.7	11.1	15.5	8.6	19.4	10.4	11.0	7.8	16.3	8.7	17.6
Finished	5.0	11.2	4.2	7.6	7.1	3.2	7.4	13.2	9.5	11.6	7.1	40.2
Electrical machinery	13.3	10.5	42.5	54.2	22.8	63.0	22.6	33.1	12.5	28.4	22.5	23.4
Component	12.5	8.6	41.9	53.6	22.1	62.6	21.3	32.1	11.6	27.4	21.7	18.9
Finished	0.8	1.9	0.6	0.6	0.7	0.4	1.3	1.0	0.9	1.0	0.8	4.5
Road transportations	14.5	21.0	5.4	4.7	14.9	5.2	17.4	10.3	10.9	7.2	11.4	6.0
Component	11.6	12.9	1.0	1.3	3.2	2.0	9.4	8.4	2.4	4.1	4.4	2.5
Finished	2.9	8.1	4.4	3.4	11.7	3.2	8.0	1.9	8.5	3.1	7.0	3.5
Oth. transport eqp	6.3	6.0	9.5	2.8	11.5	0.8	5.1	3.7	8.8	3.5	8.1	1.6
Component	0.8	0.8	0.4	0.7	1.9	0.6	2.3	1.0	0.6	0.6	0.9	0.4
Finished	5.5	5.2	9.1	2.1	9.6	0.2	2.8	2.7	8.2	2.9	7.2	1.2
Total: Component	43.3	45.9	61.9	76.9	51.8	88.1	53.7	62.9	31.4	57.5	45.6	43.5
Total: Finished	56.7	54.1	38.1	23.1	48.2	11.9	46.3	37.1	68.6	42.5	54.4	56.5
	Indonesia		**Malaysia**		**Philippines**		**Thailand**		**China**		**Developing EA**	
Exports	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04
Power generating eqp	1.3	5.7	1.9	1.2	0.2	0.3	2.7	4.4	4.6	2.1	2.8	2.1
Component	0.2	1.1	0.3	0.4	0.1	0.1	0.2	0.9	0.5	0.3	0.3	0.4
Finished	1.1	4.6	1.6	0.8	0.1	0.2	2.5	3.5	4.1	1.8	2.5	1.7
Industrial machinery	6.7	7.5	5.6	5.9	2.0	2.6	13.3	11.2	15.1	10.2	9.9	9.0
Component	3.2	4.5	1.5	2.2	1.3	1.4	5.8	3.8	4.5	4.2	3.3	3.7
Finished	3.5	3.0	4.1	3.7	0.7	1.2	7.5	7.4	10.6	6.0	6.6	5.3
Office data & telecom	55.9	51.6	49.3	59.9	37.9	41.4	49.9	43.3	41.8	60.1	46.9	57.8
Component	11.0	18.4	18.3	20.1	6.6	15.4	18.9	17.2	11.3	17.3	15.5	17.6
Finished	44.9	33.2	31.0	39.8	31.3	26.0	31.0	26.1	30.5	42.8	31.4	40.2
Electrical machinery	17.6	25.8	36.1	30.7	53.1	48.1	24.1	23.9	26.8	19.4	30.8	23.4
Component	16.1	24.0	35.0	28.8	51.4	47.8	19.9	19.5	19.2	13.8	27.1	18.9
Finished	1.5	1.8	1.1	1.9	1.7	0.3	4.2	4.4	7.6	5.6	3.7	4.5
Road transportations	12.9	8.1	1.5	1.2	6.7	6.8	6.6	13.6	8.3	6.4	5.2	6.0
Component	6.1	6.1	0.6	0.9	6.4	5.8	3.4	4.2	2.1	2.3	2.0	2.5
Finished	6.8	2.0	0.9	0.3	0.3	1.0	3.2	9.4	6.2	4.1	3.2	3.5
Oth. transport eqp	5.7	1.4	5.6	1.1	0.0	0.7	3.5	3.6	3.4	1.8	4.3	1.6
Component	1.7	0.4	0.5	0.5	0.0	0.2	3.0	2.9	0.5	0.3	1.0	0.4
Finished	4.0	1.0	5.1	0.6	0.0	0.5	0.5	0.7	2.9	1.5	3.3	1.2
Total: Component	38.3	54.5	56.2	52.9	65.8	70.7	51.2	48.5	38.1	38.2	49.2	43.5
Total: Finished	61.7	45.5	43.8	47.1	34.2	29.3	48.8	51.5	61.9	61.8	50.8	56.5

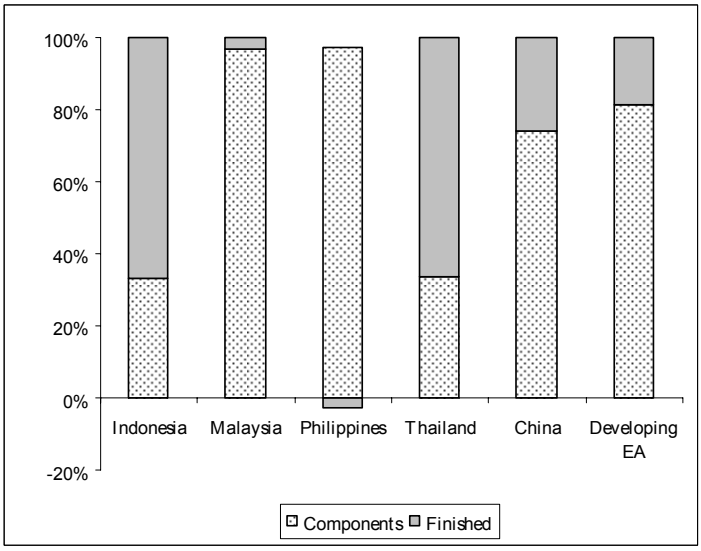
Source: UN-COMTRADE

Figure 2. Contribution to Change in Machinery Exports (1993-94 to 2003-04)



Source: UN-COMTRADE

Figure 3. Contribution to Changes in Machinery Imports (1993-94 to 2003-04)



Source: UN-COMTRADE

Table 3. Source of Imports of Machinery

	Indonesia		Malaysia		Philippines		Thailand		China		Japan		NIES		US		Rest of the World	
	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04
Indonesia																		
Component			2.8	2.6	0.3	1.0	1.1	7.8	1.9	7.2	42.3	41.7	9.6	7.6	11.9	8.1	30.1	24.0
Finished			1.7	3.8	0.4	1.3	0.8	12.2	2.8	10.1	32.6	23.1	8.5	10.3	12.1	9.2	41.1	30.0
Malaysia																		
Component	0.4	1.9			1.1	5.8	2.6	4.1	0.6	11.1	32.1	16.4	10.1	15.2	21.2	22.0	31.9	23.5
Finished	0.5	1.8			0.2	1.6	1.4	6.8	2.3	14.3	40.3	28.2	11.5	17.0	27.2	11.9	16.6	18.4
Philippines																		
Component	0.3	0.4	1.2	3.1			1.6	1.9	0.7	4.0	37.8	25.3	13.3	15.1	23.5	31.7	21.6	18.5
Finished	0.4	4.1	0.7	3.8			1.2	11.8	1.0	8.6	44.2	26.4	12.0	21.8	22.9	8.3	17.6	15.2
Thailand																		
Component	0.2	1.7	6.0	9.7	2.0	3.7			1.0	9.5	47.2	37.4	9.3	10.0	12.6	10.7	21.7	17.3
Finished	0.4	1.9	2.0	4.4	0.2	4.3			2.1	16.1	41.5	28.4	9.4	14.6	13.3	11.6	31.1	18.7
China																		
Component	0.0	0.6	0.4	3.4	0.1	1.5	0.4	2.3			31.9	24.2	31.9	25.7	9.6	5.7	25.7	36.6
Finished	0.1	1.3	0.3	2.7	0.1	2.7	0.2	3.1			31.1	24.9	18.6	16.7	17.2	11.2	32.4	37.4
Developing EA																		
Component	0.2	0.9	1.6	2.9	0.7	2.2	1.2	2.6	0.6	3.6	36.4	23.8	15.9	20.8	15.3	12.6	28.1	30.6
Finished	0.1	1.0	0.5	2.2	0.1	2.1	0.3	3.5	0.9	3.2	32.2	24.7	13.9	16.2	17.5	10.9	34.5	36.2

Source: UN-COMTRADE

Table 4. Destination of Exports of Machinery

	Indonesia		Malaysia		Philippines		Thailand		China		Japan		NIES		US		Rest of the World	
	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04
Indonesia																		
Component			4.0	8.0	0.6	2.2	2.1	5.4	0.7	3.4	10.7	14.9	6.4	6.2	14.9	10.6	60.6	49.3
Finished			3.3	2.9	0.6	1.9	6.0	3.3	3.2	2.3	3.7	13.1	5.6	6.5	44.6	18.8	33.0	51.2
Malaysia																		
Component	1.2	1.6			0.7	1.3	3.8	7.0	0.3	5.7	7.8	6.9	10.3	9.6	29.5	18.8	46.4	49.1
Finished	1.1	1.6			0.6	0.6	1.1	1.8	1.4	2.5	7.8	8.6	6.4	5.0	34.0	46.5	47.6	33.4
Philippines																		
Component	1.1	0.8	0.9	8.8			4.5	4.7	0.1	6.1	13.7	19.4	16.7	27.0	33.8	13.0	29.2	20.2
Finished	0.6	1.0	0.9	2.5			1.2	4.2	0.5	9.5	12.0	20.5	16.9	8.1	48.2	20.5	19.7	33.7
Thailand																		
Component	1.0	2.7	4.2	6.3	1.0	2.0			0.6	8.8	15.5	16.7	9.3	12.1	17.6	13.0	50.8	38.4
Finished	0.7	3.2	1.2	4.7	0.6	2.1			0.6	5.2	13.6	12.1	6.6	6.9	28.6	18.3	48.1	47.5
China																		
Component	1.5	1.0	1.6	3.1	0.4	0.7	1.1	1.5			15.6	11.9	39.3	35.4	17.3	16.3	23.2	30.1
Finished	1.5	0.8	0.8	0.9	0.4	0.4	1.4	0.7			9.1	9.7	25.7	18.6	26.6	28.2	34.5	40.7
Developing EA																		
Component	1.1	1.1	1.3	3.4	0.6	0.9	2.3	3.0	0.2	2.3	11.3	12.0	16.9	27.1	23.8	16.0	42.5	34.2
Finished	1.0	0.9	0.6	1.0	0.4	0.5	1.1	1.0	0.7	0.9	9.1	10.0	13.9	15.6	30.1	29.5	43.1	40.6

Source: UN-COMTRADE

Table 5. Index of Export Similarity: Southeast Asia vs. China

	Component		Finished	
	93-94	03-04	93-94	03-04
Power generating eqp	58.3	72.8	76.3	73.8
Industrial mchn & eqpm	55.3	60.5	40.7	63.9
Office, data & telecom	77.0	79.0	65.8	80.1
Electrical machinery	39.6	53.6	67.7	74.2
Road transportations	95.3	87.8	48.7	19.3
Other transp. Eqpm	92.9	80.0	8.7	31.3

Source: UN-COMTRADE

Table 6. Bilateral Index of Export Similarity

	China and				**Indonesia and**			**Malaysia and**		**Philippines and**
	Ind	Mys	Phl	Tha	Mys	Phl	Tha	Phl	Tha	Tha
Component										
93-94	58.2	45.3	26.9	55.3	38.2	25.3	45.9	63.1	67.8	45.9
03-04	74.7	53.9	42.6	70.1	49.5	41.6	66.5	77.8	72.8	60.3
Finished										
93-94	47.3	49.2	35.8	48.4	55.7	29.9	41.0	34.3	51.3	24.3
03-04	50.9	70.4	46.9	44.5	42.5	30.7	41.6	45.5	44.8	37.0

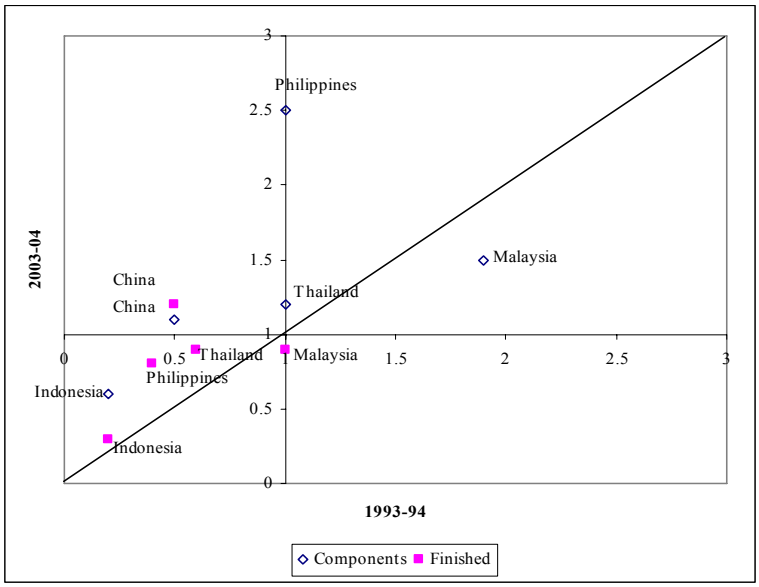
Source: UN-COMTRADE

Table 7. Revealed Comparative Advantage Index

	Export								Import			
	RCA index				Percent with RCA >1				RCA Index		Percent with RCA >1	
	Components		Finished		Components		Finished		Components		Components	
	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04
Indonesia	0.2	0.5	0.2	0.3	2.8	13.8	8.1	9.3	1.2	0.7	51.4	50.5
Malaysia	1.8	1.9	1.0	0.9	14.7	18.3	12.7	18.7	2.3	2.7	45.9	44.0
Philippines	0.8	2.4	0.3	0.6	6.4	13.9	6.2	8.1	1.1	3.0	28.4	23.1
Thailand	1.0	1.3	0.6	0.8	19.3	25.0	13.4	20.3	1.6	1.6	56.0	47.2
China	0.4	1.0	0.5	1.2	9.2	27.5	16.7	32.0	0.9	1.7	45.0	43.1
DevEA	0.8	1.2	0.5	1.0	16.5	24.8	16.7	28.0	1.4	1.9	56.9	48.6

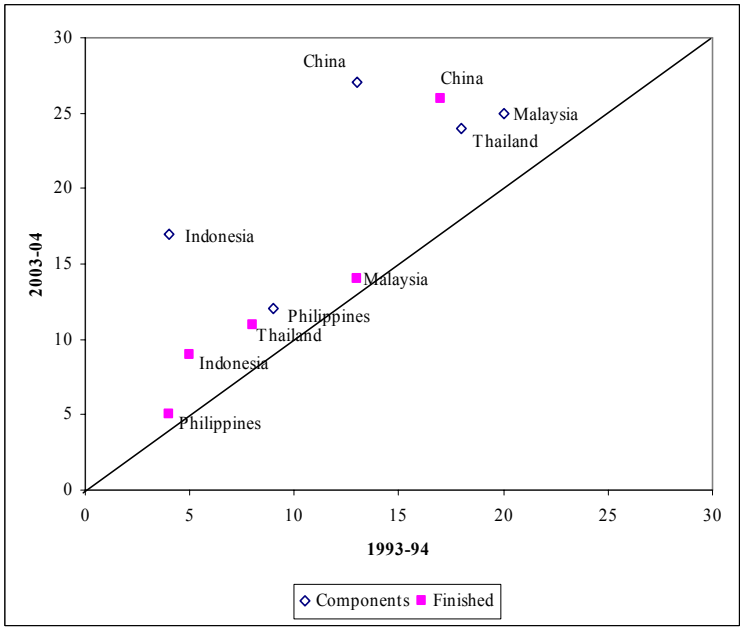
Source: UN-COMTRADE

Figure 4. RCA Index in Machinery



Source: UN-COMTRADE

Figure 5. Proportion of Products with RCA > 1



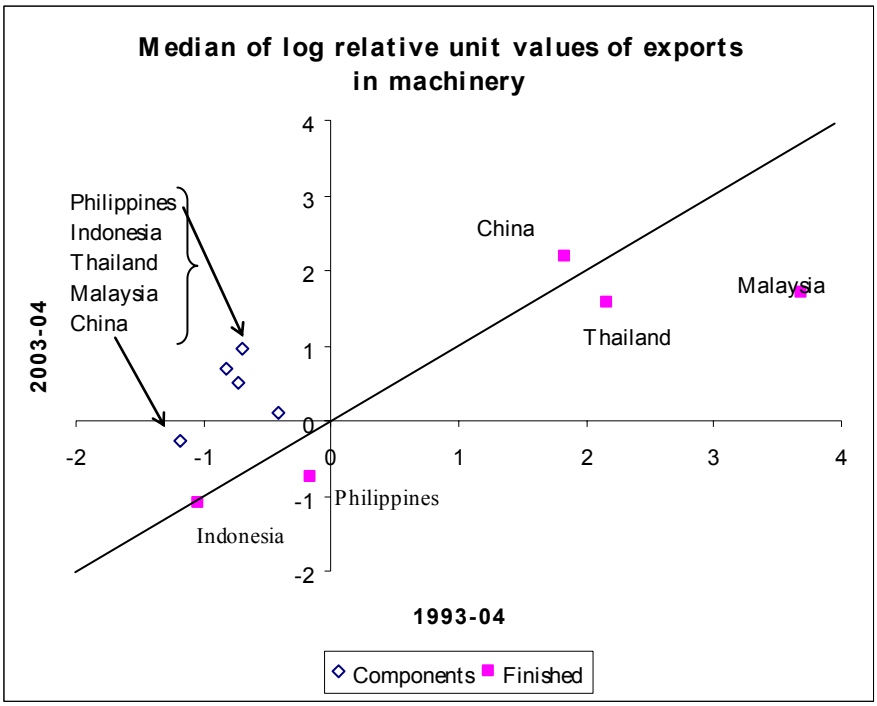
Source: UN-COMTRADE

Table 8. Revealed Comparative Advantage Index by Technological Capability

RCA index	Medium technology						High-technology	
	Automotive		Engineering		Process			
	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04
Indonesia	0.1	0.1	0.2	0.2	0.2	0.5	0.2	0.6
Malaysia	0.1	0.0	0.3	0.2	1.1	0.8	2.4	2.7
Philippines	0.1	0.4	0.0	0.2	0.4	0.4	0.9	3.1
Thailand	0.2	0.5	0.9	0.1	0.7	0.9	1.4	1.7
China	0.1	0.2	1.7	3.4	0.6	1.0	0.6	1.8
Developing EA	0.1	0.2	0.9	2.3	0.7	0.9	1.1	1.9
Percent export with RCA > 1	93-94	03-04	93-94	03-04	93-94	03-04	93-94	03-04
Indonesia	25.0	8.3	10.0	0.0	5.0	8.6	5.8	20.8
Malaysia	8.3	8.3	0.0	0.0	8.6	13.7	35.8	37.7
Philippines	0.0	16.7	0.0	0.0	5.0	5.8	15.4	25.0
Thailand	25.0	25.0	11.1	0.0	10.1	19.4	34.0	40.4
China	16.7	33.3	10.0	30.0	12.2	20.9	20.8	56.6
Developing EA	16.7	25.0	10.0	20.0	12.9	18.0	32.1	56.6

Source: UN-COMTRADE

Figure 6. Median of Relative Unit Value of Exports of Machinery



Source: UN-COMTRADE

Table 9. Effect of Chinese Exports of Machinery: Regression Signs

Dependent variable:	Equation (1) Log of value per unit		Equation (2) Change in global market share		Equation (3) Share of exports in components to China
Main explanatory variables:	China's expansion in export volume		Change in China's global market share		China's global market share in finished product
Results	**Components /1a**	**Finished /1b**	**Components /2a**	**Finished /2b**	**Components /3**
Overall	(+)	(-)	n.s	n.s	(+)
By main machinery					
Power generating eqp	(-)	n.s	n.s	n.s	n.s
Industrial mchn & eqpm	(-)	(+)	n.s	n.s	n.s
Office data & telecom	(+)	n.s	n.s	n.s	(+)
Electrical & apprtus	(+)	(-)	n.s	n.s	(+)
Road vehicles	(+) [a]	(-)	n.s	n.s	n.s
Other transp. Eqpm	(+)	n.s	n.s	n.s	n.s
By country					
Indonesia	(+)	(+)	n.s	n.s	(+)
Malaysia	n.s	(-)	n.s	n.s	n.s
Philippines	(+)	(+)	n.s	n.s	(+)
Thailand	(+)	(-)	n.s	n.s	n.s
Estimation method Sample classifications	OLS 6-digit HS		OLS 4-digit SITC		Tobit 3-digit SITC

Note:
Signs are statistically significant at least at 5% level
n.s: not statistically different from zero
[a] significant at 10 % level
/1a $\alpha 2$, /1b $\alpha 2 + \alpha 3$
/2a $\delta 2$, /2b $\delta 2 + \delta 3$
/3 $\gamma 2$

Appendix A

Table A 1. OLS Results from Equation (1)

Dependent variable: log of unit value					
	(1)	(2)	(3)	(4)	(5)
Finished goods	1.037**	1.033**	1.092**	3.537**	1.086**
	(0.127)	(0.088)	(0.117)	(0.156)	(0.117)
Log of lagged China's export quantity (lnLQCH)	0.037**	0.037**	0.035**	0.098**	0.036**
	(0.008)	(0.005)	(0.007)	(0.009)	(0.007)
Finished x lnLQCH	-0.073**	-0.071**	-0.067**	-0.195**	-0.067**
	(0.008)	(0.006)	(0.008)	(0.011)	(0.008)
Lagged log of unit value	0.742**	0.748**	0.718**		0.718**
	(0.007)	(0.004)	(0.005)		(0.005)
Log partners GDP/capita	2.024**	125.66	96.63	243.21	100.64
	(0.404)	(116.8)	(116.3)	(154.9)	(116.3)
Difference in domestic vs. partner's GDP/capita	0.738**	2.685**	2.407**	0.518	2.420**
	(0.046)	(0.641)	(0.639)	(0.863)	(0.639)
Log of lagged share of import in capital goods from China	-0.017**	-0.015**	-0.015**	-0.010**	-0.015**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log world average tariff	0.013**	0.015**		0.046**	0.010*
	(0.004)	(0.003)		(0.006)	(0.004)
Post WTO accesion		-4.07	-3.17	-7.15	-3.27
		(3.57)	(3.56)	(4.90)	(3.56)
Post crisis (> 1997)		-19.02	-14.69	-31.96	-15.27
		(17.52)	(17.44)	(20.22)	(17.44)
Constant	-2.346**	-190.89	-146.89	-386.83	-153.24
	(0.61)	(180.89)	(180.12)	(242.63)	(180.05)
Four digit HS dummy	n.a	n.a	Yes	Yes	Yes
Country dummy	n.a	Yes	Yes	Yes	Yes
Year dummy	n.a	Yes	Yes	Yes	Yes
Observations	25,792	25,792	25,807	28,406	25,792
R-squared	0.67	0.68	0.68	0.37	0.68
F-stat	3066.2	2464.27	292.64	86.82	291.45

Robust standard error in parentheses

* significant at 5%; ** significant at 1%

Table A 2. OLS Results of Equation (1) by Major Product

Dependent variable: log of unit value						
	Power generating	Industrial machinery	Office, data & telecom	Electrical machinery	Road vechicles	Othr. Transport eqpmt
Finished goods	-0.643	1.586**	1.960**	1.167**	1.096**	3.024**
	(0.5)	(0.2)	(0.6)	(0.3)	(0.4)	(1.0)
Log of lagged China's export quantity (lnLQCH)	-0.080**	0.049**	0.118**	0.033**	0.029	0.089*
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Finished x lnLQCH	0.059	-0.099**	-0.111**	-0.078**	-0.063**	-0.103
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)
Lagged log of unit value	0.599**	0.617**	0.525**	0.721**	0.805**	0.636**
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Log partners GDP/capita	22.779	-0.846	-9.018	-5.566	-2.513	-25.501
	(27.6)	(2.4)	(8.9)	(9.0)	(11.8)	(26.5)
Difference in domestic vs. partner's GDP/capita	14.69	-11.28	-28.65	-16.04	-9.97	-43.74
	(18.1)	(29.9)	(30.6)	(24.2)	(48.5)	(45.4)
Log of lagged share of import in capital goods from China	-453.52	72.65	282.27	192.13	76.95	851.12
	(553.1)	(199.1)	(292.3)	(283.7)	(371.7)	(868.1)
Log world average tariff	0.86	2.914*	2.49	0.81	2.03	5.77
	(4.0)	(1.2)	(1.6)	(1.8)	(2.3)	(5.0)
Post WTO accesion	-0.013	-0.021**	-0.004	-0.005	-0.011	-0.025
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Post crisis (> 1997)	0.014	0.021*	0.030*	0.020*	0.001	-0.025
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Constant	707.94	-110.03	-436.51	-302.04	-117.37	-1314.60
	(855.8)	(311.9)	(452.3)	(444.1)	(582.2)	(1345.4)
Four digit HS dummy	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,854	12,412	2,631	5,913	2,052	930
R-squared	0.64	0.7	0.42	0.61	0.86	0.78

Robust standard error in parentheses

* significant at 5%; ** significant at 1%

Table A 3. OLS Results of Equation (1) by Country

Dependent variable: log of unit value				
	Indonesia	Malaysia	Philippines	Thailand
Finished goods	0.619**	2.345**	1.504**	2.366**
	(0.2)	(0.3)	(0.3)	(0.3)
Log of lagged China's export quantity (lnLQCH)	0.090**	-0.027	0.158**	0.027
	(0.0)	(0.0)	(0.0)	(0.0)
Finished x lnLQCH	-0.058**	-0.084**	-0.118**	-0.117**
	(0.0)	(0.0)	(0.0)	(0.0)
Lagged log of unit value	0.390**	0.446**	0.280**	0.515**
	(0.0)	(0.0)	(0.0)	(0.0)
Log of lagged share of import in capital goods from China	-0.402**	0.13	0.302**	-0.05
	(0.1)	(0.1)	(0.1)	(0.1)
Log world average tariff	0.01	0.028**	0.032*	0.00
	(0.0)	(0.0)	(0.0)	(0.0)
Post WTO accesion	0	-0.824	0	0
	0.0	(0.8)	0.0	0.0
Post crisis (> 1997)	-5.637**	-6.667	0	1.925
	(1.0)	(5.8)	0.0	(2.7)
Constant	7.755**	-3.43	-7.813**	-1.71
	(1.5)	(2.0)	(1.3)	(1.0)
Four digit HS dummy	Yes	Yes	Yes	Yes
Country dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	7,393	8,645	3,938	5,816
R-squared	0.57	0.72	0.6	0.71

Robust standard error in parentheses

* significant at 5%; ** significant at 1%

Table A 4. OLS Results from Equation (2)

Dependent variable: change in global market share				
	(1)	(2)	(3)	(4)
Finished goods	-0.021	-0.021	-0.023	-0.028*
	(0.019)	(0.019)	(0.015)	(0.015)
Lagged change in China's global market shares (DMSCH)	-0.011	-0.002	-0.002	-0.003
	(0.012)	(0.012)	(0.013)	(0.012)
Finished*DMSCH	-0.01	-0.014	-0.013	-0.014
	(0.014)	(0.014)	(0.014)	(0.014)
Lagged change in RCA	-0.002***	-0.002***		-0.002***
	(0.001)	(0.001)		(0.001)
Growth in world GDP/cap	0.321	0.29	0.524	0.467
	(0.251)	(1.142)	(1.194)	(1.153)
Growth in reporter's GDP/cap	0.037	0.123	0.171	0.126
	(0.102)	(0.149)	(0.149)	(0.149)
Change in world import tariff	-0.002	0.006	0.002	0.005
	(0.007)	(0.007)	(0.007)	(0.007)
Post WTO accession		0.218	0.216	0.2
		(0.140)	(0.143)	(0.141)
After crisis		-0.161***	-0.159***	-0.159***
		(0.045)	(0.047)	(0.045)
Constant	0.01	-0.125	-0.128	-0.085
	(0.025)	(0.080)	(0.083)	(0.085)
Three digit SITC dummy	n.a	n.a	Yes	Yes
Country dummy	n.a	Yes	Yes	Yes
Year dummy	n.a	Yes	Yes	Yes
Observations	10,551	10,551	10,551	10,551
R-squared	0.03	0.04	0.01	0.04
F-stat	3.45**	3.45**	1.7*	1.87**

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A 5. Tobit Results from Equation (3)

Dependent variable: share of exports in components to China				
	(1)	(2)	(3)	(4)
Lagged of China's global mkt.				
share in finished goods (CMF)	0.036***	0.027**	0.048***	0.049***
	(0.011)	(0.012)	(0.014)	(0.013)
Lagged RCA index	0.079**	0.02		0.126*
	(0.036)	(0.037)		(0.068)
China's import tariff	-0.054**	0.013	0.051	0.055
	(0.027)	(0.035)	(0.040)	(0.039)
Constant	0.366	0.445	-1.847	-1.958
	(0.506)	(0.994)	(1.264)	(1.255)
Sigma	10.44	10.42	10.27	10.27
Two digit SITC dummy	n.a	n.a	Yes	Yes
Country dummy	n.a	Yes	Yes	Yes
Time dummy	n.a	Yes	Yes	Yes
Observations	1,202	1,202	1,202	1,202
Censored obs.	344	344	344	344
Log-likelihood	-3,473	-3,455	-3,432	-3,431
Chi-sq	33	78	150	155

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A 6. Partial Results from Equations (2) and (3) by Country and by Major Product

	By country				By major product					
Dependent variable: Change in global market share	Indonesia	Malaysia	Philippines	Thailand	Power generating	Industrial machinery	Office, data & telecom	Electrical machinery	Road vechicles	Othr. Transport eqpmt
Finished goods	-0.001	-0.088	-0.004	-0.03	-0.138*	-0.017	-0.061	-0.035	-0.190***	0.052
	(0.030)	(0.075)	(0.035)	(0.054)	(0.083)	(0.019)	(0.399)	(0.061)	(0.063)	(0.227)
Lagged change in China's global mkt shares (DMSCH)	0.001	0.016	-0.006	-0.018	0.000	0.005	-0.004	-0.004	-0.031	0.154
	(0.016)	(0.041)	(0.023)	(0.037)	(0.038)	(0.018)	(0.182)	(0.020)	(0.047)	(0.850)
Finished*DMSCH	-0.009	-0.034	0.017	-0.015	0.006	-0.011	-0.019	0.025	0.034	-0.158
	(0.016)	(0.042)	(0.025)	(0.038)	(0.048)	(0.020)	(0.182)	(0.030)	(0.047)	(0.851)
Lagged change in RCA	-0.001***	-0.002***	-0.001***	-0.004***	-0.004***	-0.004***	0.000	-0.001***	0.000	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	3,112	2,999	2,042	2,398	991	5,539	1,034	1,616	740	631
R-squared	0.04	0.05	0.07	0.14	0.22	0.13	0.05	0.06	0.05	0.06
F-stat	1.93	2.03	2.31	5.94	9.83	19.85	1.74	3.83	1.36	1.68
	By country				By major product					
Dependent variable: share of export in components going to China	Indonesia	Malaysia	Philippines	Thailand	Power generating	Industrial machinery	Office, data & telecom	Electrical machinery	Road vehicles	Othr. transport eqpmt
Lagged of China's global mkt. share in finished goods	0.126***	0.011	0.034**	0.031	0.082	-0.005	0.077**	0.092***	0.066	-0.619
	(0.041)	(0.007)	(0.017)	(0.021)	(0.076)	(0.020)	(0.033)	(0.020)	(0.049)	(0.403)
Lagged RCA index	0.553*	0.032	0.256	0.097	-2.869	0.891***	-0.55***	0.066	0.823	1.142
	(0.323)	(0.043)	(0.281)	(0.090)	(3.102)	(0.341)	(0.069)	(0.113)	(0.751)	(1.170)
China's import tariff	0.126	0.060*	-0.091	0.131*	0.921**	0.005	0.028	-0.083	-0.129	1.106
	(0.161)	(0.034)	(0.128)	(0.072)	(0.391)	(0.091)	(0.114)	(0.108)	(0.185)	(3.337)
Observations	1,012	965	886	935	576	1,704	390	489	393	246
Censored observations	5	41	195	165	71	174	42	54	40	25
sigma	25	25	25	27	35	28	28	36	29	33
Log-likelihood	-4,670	-4,329	-3,233	-3,635	-2,588	-7,467	-1,710	-2,232	-1,740	-1,113
Chi-sq	125,110	16,285	103,578	22,524	200	1,564	359	545	647	220

Robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

Appendix B

B.1. Major product classification

We classify products into 6 main following classifications: (1) power generating machinery, (2) industrial machinery, (3) office, data, and telecommunication equipment, (4) electrical apparatus, (5) road vehicles, and (6) other transport equipment.

The above classifications are based on 2digit SITC revision 3 where products are grouped according to the following rule:

(1) SITC = 71

(2) SITC =72, 73, 74

(3) SITC = 75 and 76

(4) SITC = 77

(5) SITC = 78

(6) SITC = 79

B.2. Definition of components and finished products

We use definition of components similar to what is used by Athukorala and Yamashita (2005). The steps in creating our data are as follows:

(1) Using their definition of components, we merge 5-digit SITC revision 3 with 6-digit HS-88 category.

(2) Using 6 digit HS-88 product classification we redefine some of goods they previously considered as components such as:

731511, 731512, 8407, 8408, 841111, 841112, 841121, 841122, 841181, 841182, 841210, 841410 841420, 841459, 841460, 841950, 841990, 842111, 842112, 842119, 842121, 842122, 842129, 842131, 842139, 850810, 851210, 851220, 851230, 851240, 853010, 853080, 853110, 853180, 853910, 853921, 853929, 853931, 853939, 853940, 871390, 901820

(3) For analysis of unit value we stop at step (2). For creating tables and other regressions we then aggregate the data to 4-digit and 3-digit SITC.

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